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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/009,216	11/08/2001	Li Yang	791 170	5554
25191	7590	04/01/2005	EXAMINER	
BURR & BROWN PO BOX 7068 SYRACUSE, NY 13261-7068			TSANG POSTER, SUSY N	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/009,216

Applicant(s)

YANG ET AL.

Examiner

Susy N. Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,9,17-19 and 25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,9,17-19 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 20041214.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action is responsive to the after-final amendment filed on 3/8/2005. Previous art rejections based on either Ono et al. (US 2001/0026890 A1) or Ono (US Patent No. 6,495,067 B2) are withdrawn by the Examiner in view of applicant's persuasive arguments. Claim 1 has been amended. Claims 2-8, 10-16, 20-24, and 26-28 have been cancelled. Claims 1, 9, 17-19, and 25 are pending and are rejected for reasons given below. This Office Action is made non-final as new grounds of rejection are made that are not necessitated by applicant's amendment.

### ***Information Disclosure Statement***

2. The information disclosure statement filed 12/14/2004 has been considered by the Examiner.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 9, 17, and 19 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Asami et al. (US 5,489,492) and as evidenced by either Harada et al. (US Patent No. 6,428,928 B1) or Shackle (US 2001/006749 A1).

Asami et al. disclose a lithium secondary battery comprising a positive electrode, a negative electrode, and a separator provided between the electrodes (col. 8, lines 49-56). The positive electrode is a composite electrode comprising an inorganic active material and an electroconductive polymer (col. 2, lines 45-65). The inorganic active material can be a transition metal oxide such as  $\text{LiMn}_2\text{O}_4$  (typographical error in the reference as  $\text{Li}_2\text{MnO}_4$ ) and the electroconductive polymer can be polypyrrole or polypyridine (col. 2, lines 45-57). The polypyrrole or polypyridine has a chemical structure that comprises a ring compound (the pyrrole or pyridine monomer units in the polymer) that comprises an organic base containing at least one nitride in a ring. The electroconductive polymer can be prepared by chemical polymerization by adding an oxidizer in a solution of monomers and then effecting oxidation and the oxidizer can be a protonic acid such as sulfuric acid (col. 3, lines 4-18). The negative electrode can be powdered or fibrous carbon (col. 8, lines 57-65). The electrolyte in the battery can be  $\text{LiPF}_6$  (col. 9, lines 12-16).

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Asami et al. also disclose that the form of the unit cell in the battery is not specifically limited and can be various types such as coin type, sheet type, cylinder type (wound type), rectangular type, etc. (col. 9, lines 45-50).

Asami et al. do not explicitly state that the protonic acid is unitarily combined with the polypyrrole or polypyridine during the oxidation process. However, the protonic acid such as sulfuric acid is complexed with the polymer in order to render it electrically conductive as is known by one of ordinary skill in the art and as evidenced by either Harada et al. (Us Patent No. 6,428,928 B1) or Shackle (US 2001/006749 A1).

Harada et al. disclose that when polymers such as polyacetylene and polypyridine become electrically conductive when they are oxidized electrochemically by doping with the polymer with a p-type dopant (col. 1, lines 15-25). Formula 1 in column 1 of the Harada et al. reference shows that polyphenylquinoxaline is doped with chloride ions in concentrated hydrochloric acid (col. 1, lines 49-66).

Shackle disclose that a dopant is selected to provide solubility to a polymer as well as to render the polymer conducting (paragraph 15). The conductive polymer can be polypyrrole (paragraph 14). Shackle also disclose that a p-type electro-active polymer is obtained by reacting the virgin polymer with oxidizing electron acceptor dopants where the electron acceptor dopants induce p-type conductivity in the polymer by oxidizing the polymer to a polycation and the dopant is reduced to a charge neutralizing anion (paragraph 47). If a polymer such as polyaniline is protonated by reaction with a functionalized protonic acid, and the virgin polymer is represented by P and the functionalized protonic acid is  $H^+M^-R$  where  $H^+$  is a proton and  $M^-$  is an anion and R is a solubilizing group (paragraph 51). The reaction with the polymer produces

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HP<sup>+</sup>M<sup>-</sup>R which is equivalent to the oxidation of the polymer (paragraph 51). In the case of Asami et al., the polypyrrole is oxidized by the sulfuric acid and the counter anion (dopant) is the sulfate anion.

6. Claim 18 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Asami et al. (US 5,489,492) and as evidenced by either Harada et al. (US Patent No. 6,428,928 B1) or Shackle (US 2001/006749 A1) and further evidenced by Davidson et al. (US Patent No. 5,506,078).

Asami et al. as evidenced by either Harada et al. or Shackle disclose all the limitations of claim 18 (see above) except that the composition LiMn<sub>2</sub>O<sub>4</sub> is a cubic spinel. However it is known to one of ordinary skill in the art that the composition LiMn<sub>2</sub>O<sub>4</sub> inherently has a cubic spinel structure as evidenced by Davidson et al. which discloses that LiMn<sub>2</sub>O<sub>4</sub> is a spinel type (which is cubic) structure (see abstract and col. 1, lines 38-47).

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Asami et al. (US 5,489,492) and as evidenced by either Harada et al. (US Patent No. 6,428,928 B1) or Shackle (US 2001/006749 A1) in view of Davidson et al. (US Patent No. 5,506,078).

Asami et al. as evidenced by either Harada et al. or Shackle disclose all the limitations of claim 18 (see above) except that the composition LiMn<sub>2</sub>O<sub>4</sub> is a cubic spinel. If applicant disputes the formula of Asami et al., Davidson et al. teach that LiMn<sub>2</sub>O<sub>4</sub> is used in a lithium batteries (see abstract and col. 1, lines 50-67).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to use in the lithium battery of Asami et al. because is a stable active material that is commercially available and provides a high energy density lithium battery.

It is known to one of ordinary skill in the art that the composition  $\text{LiMn}_2\text{O}_4$  inherently has a cubic spinel structure as evidenced by Davidson et al. which discloses that disclose that  $\text{LiMn}_2\text{O}_4$  is a spinel type (which is cubic) structure (see abstract and col. 1, lines 38-47).

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Asami et al. (US 5,489,492) and as evidenced by either Harada et al. (Us Patent No. 6,428,928 B1) or Shackle (US 2001/006749 A1) as applied to claim 1 above, and further in view of Zhong et al. (US Pat. No. 5,700,597).

Asami et al. as evidenced by either Harada et al. or Shackle disclose all the limitations of claim 18 (see above) except that the lithium secondary battery has a capacity of 2 Ah or more.

Zhong et al. '597 teach a lithium battery as a high energy density source for an electric vehicle (col. 1, lines 20-25).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the lithium secondary battery in the electric vehicle because a lithium secondary battery has high energy density, is light weight, and would not cause exhaust air polluting substances during the operation of the electric vehicle.

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to produce a lithium secondary battery having a capacity of 2Ah or more in

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order to operate a high energy consuming electronic device such as an electric vehicle since the power requirements of electronic devices differ and it would have been obvious to manufacture lithium batteries with varying capacities for different applications. A person of ordinary skill in the art would be motivated to and would be knowledgeable about how to scale up the amount of active material necessary in a lithium secondary battery in order to provide enough electricity to operate an electric vehicle or any other electronic device.

### ***Response to Arguments***

9. Applicant's arguments with respect to claims 1, 9, 17-19, and 25 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished



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st/ *Susy Tsang-Foster*

Susy Tsang-Foster  
Primary Examiner  
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